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BEFORE THE  
**Federal Communications Commission**  
WASHINGTON, D.C. 20554

In the Matter of  
  
Proceeding To Address  
Network Unwanted Emissions

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RM-9740

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

To: The Commission

**COMMENTS OF LOCKHEED MARTIN CORPORATION**

Lockheed Martin Corporation ("Lockheed Martin"), pursuant to Section 1.405 and 1.419 of the Commission's Rules,<sup>1</sup> hereby submits its comments in response to the Commission's public notice in the above-referenced matter.<sup>2</sup> In its *Public Notice*, the Commission seeks comments regarding a letter submitted by Motorola Satcom, Hughes Space & Communications Corporation, and Teledesic (together, the "Petitioners") requesting that the Commission update its out-of-band ("OOB") emission rules for satellite networks. The Commission is treating the letter as a petition for rule making.

Lockheed Martin supports the initiation of such proceeding, and provides preliminary answers to specific questions posed in the *Public Notice*. Lockheed Martin also believes, however, that before the Commission goes any further in this matter, it should establish an informal industry/government working group within the U.S. to recommend specific OOB emission limits that will permit the introduction of satellite

<sup>1</sup> 47 C.F.R. § 1.405 and 1.419.

<sup>2</sup> *Proceeding to Address Satellite Network Unwanted Emissions*, FCC Public Notice, RM-9740 (DA-99-2601) (released November 19, 1999) ("Public Notice").

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systems utilizing new and future technologies not envisioned when the current emission limits were developed.

## **I. STATEMENT OF INTEREST**

Lockheed Martin is a major supplier of satellite technology and services. It has direct and indirect interests in existing and proposed satellite systems, geostationary satellite orbit ("GSO") as well as non-geostationary satellite orbit ("NGSO"), that operate or will operate in the L-band (1/2 GHz), C-band (4/6 GHz), Ku-band (11/14 GHz), Ka-band (19/29 GHz), and V-band (40/50 GHz) frequency ranges. Lockheed Martin is concerned that if the Commission were to initiate a rulemaking proceeding to determine OOB emission standards before conducting an appropriate study to determine the most appropriate OOB emission limits, the result could be the adoption of standards that would hinder the implementation of future satellite systems, thus denying the public the benefits from a vibrant and competitive satellite industry.

## **II. DISCUSSION**

As the Petitioners observe, the current emission rules have been in existence in their present form for more than 25 years and were crafted to accommodate geostationary satellite technologies.<sup>3</sup> Although satellite payload design has matured over the years, the commercial satellite industry continuously innovates in an attempt to make use of its spectrum more efficiently or to optimize the satellite's ability to serve different geographical areas with different traffic levels. Any new mask that the FCC may adopt

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<sup>3</sup> See Letter from Motorola Satcom, Hughes Space & Communications Corporation, and Teledesic requesting that the Commission initiate a proceeding to update the Commission's out-of-band emission rules for satellite networks, RM-9740, at 1 (July 1, 1999).

should not penalize new technologies that are more spectrally efficient, but may have the trade-off of higher out-of-band emissions.

Therefore, Lockheed Martin agrees with the Petitioners' call for the Commission to initiate a rulemaking proceeding to review and revise the current OOB emission rules. Lockheed Martin responds to the Commission's specific queries below, and suggests a method of proceeding on the complex issues raised.

**A. Establishment of an Informal Industry/Government Working Group**

Lockheed Martin believes that if the Commission is to effectively establish appropriate OOB emission levels within a rulemaking proceeding, it should first establish an informal working group, comprised of satellite equipment manufacturers, satellite operators, and representatives of affected government agencies. The purpose of this informal working group would be to develop proposals for practical OOB emission levels that can be used by the Commission to form the basis for proposals to be advanced in the formal rulemaking proceeding. This is a complex area with multiple interrelated concerns and issues. This factor, in conjunction with the time pressures that are brought to bear by the parallel international processes and the need for an updating of very old rules, makes the establishment of such an informal working group particularly appropriate here. Such groups have proven effective in other areas (*e.g.*, the informal group that recently reached consensus on blanket licensing issues for Ka-band GSO earth stations) where the complexities make the interaction-free give and take of a formal proceeding unwieldy and inefficient.

**B. Lockheed Martin's Responses to the Commission's Five Questions**

In the *Public Notice* the Commission asks commenters to address specific questions concerning the out-of-band limits that would be appropriate to impose on satellite networks. While Lockheed Martin believes that these questions are appropriate for reference to the informal working group it recommends above, Lockheed Martin provides the following preliminary responses to the Commission's questions:

**1. Should the generic out-of-band mask be in dBc, dBs, or PFD units or some combination?**

The working group may conclude that the OOB emission mask should be based on either a dBc or a dBs unit, rather than a PFD limit. An OOB emission mask establishes a performance standard for a transmitter. A spacecraft manufacturer can easily examine whether a space station is in compliance with a mask by taking measurements of the transmitter on the ground prior to launch. A PFD is a function of the EIRP in the direction of, and the distance to a reference location. However, if the working group were to find that PFD levels can be adequately and easily measured on the ground for the purpose of determining compliance with a generic OOB mask, then the PFD approach would be preferable.

It is important to note that measurements of OOB emissions in "dBc" units assume that the unmodulated and the modulated carrier have identical output powers. However, this assumption may not prove to be accurate, and any difference in the output powers could distort the RFI effect of the modulated carrier. Similarly, accurate measurements of OOB emissions in "dBs" units may also raise issues, as a measurement of this type is taken relative to an assumed peak or some average of the power spectral

density ("PSD"). Finally, it is difficult to determine the correct value of this parameter, thus increasing the likelihood of an inaccurate measurement.

**2. Should the emissions of a multi-carrier system with a wideband frequency allocation be treated differently than those of a system with a single broadband carrier?**

In answering this question, the goal should be to develop a method to calculate the worst case effect of multi-carrier systems, so as to not underestimate OOB emissions from these types of systems. The overall method, however, should not be a function of how a satellite operator or designer implements the specific satellite network.

It should be kept in mind that there are several problems with the method so far considered within the International Telecommunication Union ("ITU") task group that has been addressing OOB interference from multi-carrier systems. First, the ITU method assumes that carriers are grouped together with certain separation and bandwidth characteristics. However, these assumed characteristics will probably be significantly different for the actual multi-carrier systems. Second, the ITU method assumes one interference-causing system. However, in actuality, many systems operate simultaneously to cause OOB emissions. Careful consideration of all satellite technologies is necessary in order to develop an appropriate approach.

**3. Should the mask be defined as a function of authorized bandwidth (FCC approach) or necessary bandwidth (ITU approach)?**

Lockheed Martin notes that neither the Commission's Rules nor the ITU Radio Regulations provide clear definitions of the "authorized" bandwidth and "necessary" bandwidth. Therefore, the informal industry working group recommended herein should clearly define these bandwidth parameters, as well as their relationship to each other.

Assuming that the "authorized" bandwidth is equal to or exceeds the "necessary" bandwidth, as this last one is referred to in the ITU Regulations, further consideration needs to be given as to whether the Commission should continue the ITU approach of specifying emission masks in terms of the "necessary" bandwidth and frequency separation from the band edge of that bandwidth. Lockheed Martin believes that the guiding principle, as for all of the answers to these questions, is that the appropriate approach is that which is least restrictive.

**4. Should a generic mask be used for all space services allocations unless otherwise specified?**

The Commission should develop a generic mask applicable to all satellite services used for communications (*i.e.*, as opposed to other services such as radars or terrestrial services). The new emission standards should have wide applicability across different satellites with some specified exceptions, for example, for each beam or a given Earth footprint.

Despite Lockheed Martin's clear preference, as noted above, for a generic mask for all space services, Lockheed Martin is nonetheless willing to consider other options that may be identified for further discussion.

**5. Should the Commission's Rules incorporate out-of-band values agreed in Recommendations of the ITU-R?**

Lockheed Martin believes that the Commission should incorporate into its rules the OOB values agreed and to be agreed in Recommendations of the ITU-R. In general, ITU levels should be complied with as satellite networks are increasingly regional or

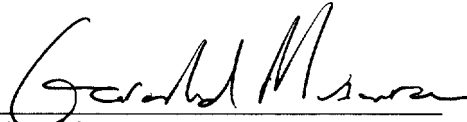
global, and the same OOB emission levels should be acceptable to all the countries covered by a given satellite network. The Commission, however, may provide for exceptions for certain services operating within the U.S. -- *e.g.*, domestic military systems.

### **III. CONCLUSION**

Lockheed Martin supports the initiation of a rulemaking proceeding to establish new OOB emission rules for satellite networks. The most efficient manner to do this, however, is for the Commission to initially establish an informal working group that would work with the U.S. satellite industry to develop appropriate proposals to consider within the rulemaking proceeding and to answer the specific questions the Commission posed in the Public Notice.

Respectfully Submitted,

LOCKHEED MARTIN CORPORATION

By:   
Gerald Musarra  
Vice President,  
Trade and Regulatory Affairs  
Lockheed Martin Corporation  
Crystal Square 2, Suite 403  
1725 Jefferson Davis Highway  
Arlington, VA 22202  
(703) 413-5791

December 20, 1999

## **CERTIFICATE OF SERVICE**

I, Jennifer Warren, do hereby certify that copies of the foregoing "Comments of Lockheed Martin Corporation" were delivered this 20<sup>th</sup> day of December, 1999, to the following in the manner indicated:

### **VIA HAND DELIVERY**

Thomas Tycz, Chief  
Satellite & Radiocommunications Division  
Internatioanal Bureau  
Federal Communications Commission  
445-12th Street, SW  
Room 6-A665  
Washington, DC 20554

Bill Luther  
Internatioanal Bureau  
Federal Communications Commission  
445-12th Street, SW  
Room 7-B454  
Washington, DC 20554

Allen Yang  
International Bureau  
Federal Communications Commission  
445-12th Street, SW  
Room 7-B455  
Washington, DC 20554

### **VIA U.S. MAIL**

Mr. Charles Bucher  
Director of Spectrum Standards  
Motorola Satcom  
c/o Jansky/Barmat Telecommunications, inc.  
1120-19th Street  
Suite 333  
Washington, DC 20036

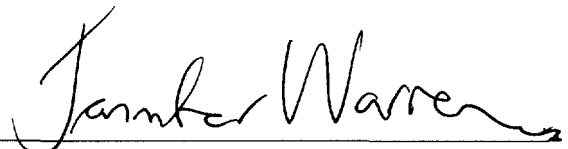
Mr. Tom Walsh  
Manager, Spectrum Planning and Regulation  
Hughes Space & Communications  
c/o Jansky/Barmat Telecommunications, inc.  
1120-19th Street  
Suite 333  
Washington, DC 20036

Dr. Jose Albuquerque  
Executive Director, Technical Regulatory  
Affairs  
Teledesic  
c/o Jansky/Barmat Telecommunications, inc.  
1120-19th Street  
Suite 333  
Washington, DC 20036

William Hatch  
International Spectrum Policy and  
Management Program Manager  
NTIA  
Herbert Clark Hoover Building  
14th Street and Constitution Avenue, NW  
Room 4099A  
Washington, DC 20230



Rob Haines  
Office of Spectrum Management  
NTIA  
Herbert Clark Hoover Building  
14th Street and Constitution Avenue, NW  
Room 6725  
Washington, DC 20230

  
Jennifer Warren